5. Post Graduate Programmes

5.1 M.Tech. in Civil Engineering with Construction Management

ACADEMIC SCHEME AND SYLLABUS
Year 2015-16

Scheme for M.Tech. (Civil) with Construction Management Courses (Semester – I) Academic year 2015-16

Sr. No.	Course	Code	Course Plan for Each Week (Hrs)			Credits	Scheme of evaluation Scheme						Total
			Lectures	Laboratory	Tutorial		Test 1	Test 2	End Semester		End Semester Weightage (%)	In semester Scheme of evaluation	
									Marks	Duration			
1	Construction Management and Organisation	MTCM101	3	--	2	4	20	20	100	4	60	25	125
2	Applied Statistics and Quantitative Techniques	MTCM102	3	_	2	4	20	20	100	4	60	25	125
3	Advanced Construction Techniques	MTCM103	3	--	2	4	20	20	100	4	60	25	125
4	Accounting and Finance Management	MTCM104	3	--	2	4	20	20	100	4	60	25	125
5	Elective – I	MTCM105 to MTCM120	3	--	2	4	20	20	100	4	60	25	125
6	Seminar – I	MTCM121	--	--	4	2	--	--	--	--	--	125	125
Total			**15**	**--**	**14**	**22**	**100**	**100**	---		--	**250**	**750**

NOTE - Test 1, Test 2 and end semester weightage marks will be added and shown as the theory marks in the mark sheet. Duration of Test 1, Test 2 is of 1 hour. For passing, Student must secure minimum 50% marks in each course with all heads of passing taken together and minimum 50% marks in the end semester examination.

Assessment criteria for laboratory/Tutorial work. i.e. weightage for assessment shall be as follows:

(i) Attendance in Laboratory/Tutorial = 20%,

(ii) Journal/Drawing sheet/Sketch book = 40%,

(iii) MCQ/Oral/Test = 40%.

Sr. No.	Code	Elective –I
1.	MTCM105	Safety Management
2.	MTCM107	Repair, Rehabilitation and Retrofitting Techniques
3.	MTCM109	Disaster Management

Sr. No.	Code	Elective - I
1.	MTCM106	Construction materials
2.	MTCM108	Management of Infrastructure Services
3.	MTCM110	Construction Marketing

Scheme for M.Tech. (Civil) with Construction Management Courses (Semester – II) Academic year 2015-16

Sr. No.	Course	Code	Course Plan for Each Week (Hrs)			Credits	Scheme of evaluation Scheme						Total
			Lectures	Laboratory	Tutorial		Test 1	Test 2	End Semester		End Semester Weightage (%)	In semester Scheme of evaluation	
									Marks	Duration			
1	Legal Aspects in Construction	MTCM151	3	--	2	4	20	20	100	4	60	25	125
2	Management of Construction Resources	MTCM152	3	_	2	4	20	20	100	4	60	25	125
3	Project Monitoring and Control	MTCM153	3	--	2	4	20	20	100	4	60	25	125
4	Project Appraisal, Planning and Scheduling	MTCM154	3	--	2	4	20	20	100	4	60	25	125
5	Elective – II	MTCM155 to MTCM 170	3	--	2	4	20	20	100	4	60	25	125
6	Mini Project + Seminar II	MTCM171	--	--	4	2	--	--	--	--	--	125	125
Total			**15**	**--**	**14**	**22**	**100**	**100**	**---**		**--**	**250**	**750**

NOTE - Test 1, Test 2 and end semester weightage marks will be added and shown as the theory marks in the mark sheet. Duration of Test 1, Test 2 is of 1 hour. For passing, Student must secure minimum 50% marks in each course with all heads of passing taken together and minimum 50% marks in the end semester examination.

Assessment criteria for laboratory/Tutorial work. i.e. weightage for assessment shall be as follows:

(i) Attendance in Laboratory/Tutorial = 20%,

(ii) Journal/Drawing sheet/Sketch book = 40%,

(iii) MCQ/Oral/Test = 40%.

Elective – II Courses

Sr. No.	Code	Elective -II
1.	MTCM155	Risk Management
2.	MTCM157	Value Engineering
3.	MTCM159	International Construction Business

Sr. No.	Code	Elective – II
1.	MTCM156	International Contracting
2.	MTCM158	Management of Housing Projects
3.	MTCM160	Total Quality Management in Construction

Scheme for M. Tech. (Civil) with Construction Management Courses (Semester – III) Academic year 2015-16

Sr. No.	Course	Code	Course Plan for Each Week (Hrs)			Credits	Scheme of evaluation Scheme						Total
			Lectures	Laboratory	Tutorial		Test 1	Test 2	End Semester	End Semester Weightage (%)	Report	Seminar	
1	Seminar on Literature Review	MTCM176	--	--	2	5	--	--	--	--	50*	50*	100
2	Dissertation Stage-I Seminar	MTCM177	--	_	2	10	--	_	--	_	50*	50*	100
Total			**--**	**--**	**4**	**15**	**--**	**--**	**---**	**--**	**100**	**100**	**200**

* **Examined by supervisor and at least one internal examiner**

For passing, Student must secure minimum 50% marks in each course with all heads of passing taken together,

Scheme for M. Tech. (Civil) with Construction Management Courses (Semester – IV) Academic year 2015-16

Sr. No.	Course	Code	Course Plan for Each Week (Hrs)			Credits	Scheme of evaluation Scheme						Total
			Lectures	Laboratory	Tutorial		Test 1	Test 2	End Semester	End Semester Weightage (%)	Report	Seminar	
1	Dissertation Stage-II Seminar (Pre-Synopsis)	MTCM178	--	--	4	10	--	--	--	--	50*	100*	150
2	Dissertation & Viva-Voce	MTCM179	--	_	4	15	--	_	--	_	50**	100**	150
Total			**--**	**--**	**8**	**25**	**--**	**--**	**---**	**--**	**100**	**200**	**300**

* Examined by supervisor and at least one internal examiner

** Examined by supervisor and one approved external examiner.

For passing, Student must secure minimum 50% marks in each course with all heads of passing taken together.

SEMESTER-I	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM101	**COURSE: Construction Management and Organisation**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 x 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

* 60% weightage for end semester exam

Course Objectives:

- To summarize the principles of management.
- To discuss scope and functions of management in construction.
- To report planning processes, strategies and policies.
- To summarize working of organization and group decision making.
- To describe procedures of organizational developments.
- To identify quality of team leader and qualities of project leader.
- To discuss the processes of construction project controlling.

Course Outcomes:

At the end of this course, students will be able to:

- Apply fundamentals of management.
- Utilize scope and functions of management in construction.
- Implement planning strategies and policies.
- Execute work in group in an organization
- Carry out organization.
- Demonstrate leadership qualities.
- Implement construction project processes with control.

Course content:

Sr.No.	**Description**	**Hr**
1	**Management** Need, what is it, systems approach, and emergence of management thought, contributions of Fredrick Taylor, Henry Fayol, emergence of behavioral sciences, and that of the modern management thought.	06
2	**Construction Management** Need, nature of construction industry, scope and functions of construction management.	06
3	**Planning** Planning process, objectives, strategies and policies, making planning effective.	06
4	**Organizing** Nature and purpose, types of organizations, organizational behavior, informal organizations, organizational climate, group decision making , making organizing effective	06

5	**Staffing** Nature and purpose, selection, appraisal, organizational development	06
6	**Leading** Managing and human factor, motivation, leadership, team development, communication, managing conflicts, qualities of project manager	**06**
7	**Controlling** Process of controlling, direct and indirect control.	06

Term work:
Report on assignments including problems based on the above syllabus shall be submitted as term work. One assignment on each module is to be submitted.
The distribution of term work marks will be as follows:
Reports of assignments : 25 marks

Recommended Books:

1. Koontz, O'Donnell &Weihrich (2010); "Management", Mcgraw Hill. ISBN-13: 9780070144958. 464p.
2. Chinowsky, Paul S. & Songer, Anthony D. (2011) "Organization Management in Construction". Routledge. ISBN-13: 978-0415572613. 216p.
3. Sears, Keoki S, (2008) "Construction Project Management: A Practical Guide to Field Construction Management". Wiley. ASIN: B00HQ1CNE2.
4. Frank Harris (2013); "Modern Construction Management", Ronald Mccaffer Wiley Blackwell Publications. ISBN-13: 978-0470672174. 572p.
5. Wagner.Harvey M (1975) "Principles of Management Science" Prentice Hall College Div. ISBN-13: 978-0137095353. 612p.
6. Snell, Scott & Bohlander George (2009) "Managing Human Resources" South-Western Cengage Learning; ISBN-13: 978-0324593310. 864p.
7. Dessler, Gary (2008) "Human Resource Management" Prentice Hall. ISBN-13: 978-0131746176. 801p.
8. Dharwadkar P. P (1992); "Management In Construction Industry" Oxford & IBH Luthans,
9. Kinicki (2007); "Organization Behavior", Mcgraw Hill. ISBN-13: 978-0070600980. 592p.

Sr. No.	Examination	Module
1	T-1	Module 1 and 2
2	T-2	Module 3 and 4
3	Final Examination	Module 1 to 7

SEMESTER-I	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM102	**COURSE: Applied Statistics and Quantitative Techniques**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Hours	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

*60% weightage for end semester exam

Course Objectives:

- To Describe Different methods of statistics.
- To explain the knowledge of probability theory and application in construction Industry.
- To identify about different methods of data collections and its analysis.
- To outline the importance of Hypothesis testing and its application in Civil Engineering.
- To Discuss Application of ANOVA.
- To explain the application of linear programming problem and transportation problem in construction industry.

Course Outcome:

Students will be able to:

- Practice different methods of statistics and its applications, different methods of data collection and presentation.
- Carry out application of Binomial Distribution, Poissons distribution in civil engineering projects.
- Implement the concept of linear Programming Problem and Transportation Problem in getting the optimum solution for civil engineering problem.
- Test hypothesis, significance level, type – I and type – II error in hypothesis.

Course content:

Sr.No.	**Description**	**Hrs**
1	**Review of basic statistics and probability**	**06**
2	**Probability Distributions:** Theoretical, binomial, poisson, normal, exponential, hypergeometric, uniform	**06**
3	**Sampling and Sampling Distributions:** Probability and non-probability samples, sampling and non-sampling errors, sample size, sampling distributions : t, F and χ^2 distributions	**06**

4	**Hypothesis Testing:** Type I and II error, testing of mean, proportion, tests for equality of mean and variances of two populations, confidence interval, χ^2 test for goodness of fit, ANOVA (one way classification), Non parametric tests : sign test, U test	**06**
5	**Correlation and Regression:** Karl Pearson's and Rank Correlation coefficient, simple linear regression : least squares method. **Simulation:** Random number generation. Monte Carlo method, applications	**06**
6	**Management Decision Making:** System approach, decision making under uncertainty and risk: decision tables and decision tree	**06**
7	**Linear Programming:** Graphical solution, simplex method, dual, sensitivity analysis, transportation and assignment problems	**06**

Recommended Books:

1. Shrivastava, Shenoy& Sharma (1989); "Quantitative Techniques for Managerial Decisions" New Age International. ISBN-13: 9788122401899. 941p.
2. Kothari C R (2004); "Research Methodology: Methods and Techniques", New Age International. ISBN-13: 978-8122415223. 401p.
3. Goode W J &Hatt P K (2006) "Methods in Social Research" Surjeet Publication. 386p.

Sr. No.	Examination	Module
1	T-1	Module 1 and 2
2	T-2	Module 3 and 4
3	Final Examination	Module 1 to 7

SEMESTER-I	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM103	**COURSE:Advanced Construction Techniques**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Hours	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

* 60% weightage for end semester exam

Course Objective:

- To summarize the concept of soil explorations
- To discuss the concept of soil improvement techniques
- To describe Tunneling operations
- To outline the concept caissons and cofferdams
- To explain students with precast components
- To summarize pumped concrete applications
- To report new/non conventional methods of construction

Course Outcome:
Students will be able to:

- Carry out soil exploration techniques
- Carry out soil improvement techniques
- Execute methods of Tunneling operations
- Illustrate the construction of caissons and cofferdam
- Practice various applications precast components
- Execute pumped concrete applications
- Implement new/non conventional methods of construction

Module	**Topics**	**No. of Lectures**
1	Review of subsurface soil explorations; Hazardous site and foundation conditions: Solution prone formations, expansive soils, landslide hazards, liquefaction of soils	04
2	Soil improvement; Mechanical, thermal, chemical. Special topics of excavation Open excavation: trenching machines, blasting methods, dewatering methods	06

3	Tunneling: ventilation, lighting and drainage, cut and cover, rock tunneling, shield tunneling in free air, compressed air tunneling, linings, machine tunneling, supporting systems	06
4	Construction methods for drilled shafts, caissons, dikes and cribs, cofferdams, pile foundation; Underpinning procedures Shores, needles, grillages, pit underpinning, pile underpinning, miscellaneous methods	06
5	Special topics of concrete construction: Formwork: types, design criteria, patented systems Fabrication of precast and prestressed components	06
6	Pumped and sprayed concrete and mortar, ready mixedconcrete, preplaced aggregate concrete, polymer modified concrete, high performance concrete, roller compacted concrete, concrete masonry, underwater concreting. Reinforcing steel: types, bending, placing, splicing and spacing, tendons	08
7	New / non conventional materials for construction, geotextiles, construction chemicals etc.Environmental influences on structures Thermal effects, corrosion, oxidation, irradiation of materials and structures, methods of prevention	04

Term work:-
Assignments consisting of minimum twenty problems covering entire syllabus shall be submitted as term work.

Recommended Books:-

1. Jonathan Ricketts, M. Loftin, Frederick Merritt (2004); "Standard Handbook for Civil Engineers", Mcgraw Hill. ISBN-13: 978-0071433372. 1600p.
2. Waddell (1974); "Concrete Construction Handbook", Mcgraw Hill
3. J.R. Illingworth (2002);"Construction Methods and Planning" CRC Press. ISBN 13: 9780203478578. 440p.
4. Varma Mahesh (1975); "Construction Equipment, Its Planning & Application" Metropolitan. 539p.

Sr. No.	Examination	Module
1	T-1	Module 1 and 2
2	T-2	Module 3 and 4
3	Final Examination	Module 1 to 7

SEMESTER-I	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM104	**COURSE: Accounting and Finance Management**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

*60% weightage for end semester exam

Course Objective:

- To explain the basic concept of accounting mechanics
- To illustrate financial statement
- To discuss techniques of financial analysis
- To summarize use of policies of project finance
- To report long term investment decisions
- To describe the management of current assets

Course Outcome: students will be able to

- Practice basic accounting mechanics
- Carry out financial statement
- Implement various techniques of financial analysis
- Utilize various policies of project finance
- Vrrify long term investment decisions
- Appraise the management of current assets

Course content:

Sr.No.	**Description**	**Hr.**
1	**Basic accounting mechanics** Generally accepted accounting principles, books of original entry	06
2	**Preparation of financial statements** Income statement, balance sheet	06
3	**Techniques of financial analysis** Statement of changes in financial position (working capital / cash flow / total resources basis)Ratio analysis	06
4	**Project financing** means, norms, and policies of financial institutions	06
5	**Long term investment decisions**	06

	cash flow estimates, evaluating techniques, alternative selection, basic concepts of analysis of risk and uncertainty, cost of capital, lease financing	
6	**Management of current assets-I** Planning, financing and control of working capital	06
7	**Management of current assets-II** Management of cash, receivables management, inventory management	06

Recommended Books:

1. S. K. Bhattacharyya, John Dearden (1996); "Accounting for Management: Text and Cases" South Asia Books. ISBN 13: 9780706928976.
2. Prasanna Chandra (2011); "Financial Management", Tata McGraw-Hill Education. ISBN 13: 9780071078405. 1026p.

Sr. No.	Examination	Module
1	T-1	Module 1 and 2
2	T-2	Module 3 and 4
3	Final Examination	Module 1 to 7

SEMESTER-I	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM105	**COURSE: Elective – I : Safety Management**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

* 60% weightage for end semester exam

Course Objective:

- To Describe the concept of Construction Safety Management
- To report safety manuals
- To Discuss Safety in construction operations
- To outline safety in use of construction equipments.
- To report use of various safety equipments used on site
- To explain Labour laws, legal requirement and cost aspects of accidents on site.
- To summarize safety policies, methods, equipment, training provided on any ISO approved Construction Company.

Course Outcome:students will be able to

- Examine Construction Safety Management
- Formulate safety manuals
- Practice Safety in construction operations
- Use of accident free practice construction equipments
- Use of Labour laws, legal requirement and cost aspects of accidents on site.
- Implementation of safety policies, methods, equipment, training provided on any ISO approved construction company

Course content:

Sr.No.	**Description**	**Hr.**
1	Construction Safety Management – Role of various parties, duties and responsibilities of top management, site managers, supervisors etc. role of safety officers, responsibilities of general employees, safety committee, safety training, incentives and monitoring.	**06**
2	Writing safety manuals, preparing safety checklists and inspection reports.	**06**
3	Safety in construction operations – Safety of accidents on various construction sites such as buildings, dams, tunnels, bridges, roads, etc. safety at various stages of construction. Prevention of accidents. Safety measures.	**06**
4	Safety in use of construction equipment e.g. vehicles, cranes, hoists and lifts etc. safety of scaffolding and working platforms. Safety while using electrical	**06**

	appliances. Explosives	
5	Various safety equipment and gear used on site. First aid on site.	**06**
6	Labour laws, legal requirement and cost aspects of accidents on site.	**06**
7	Study of safety policies, methods, equipment and training provided on any ISO approved construction company.	**06**

Recommended Books:

1. V. J. Davies, K. Tomasin (1996); "Construction Safety Handbook", Thomas Telford, London. Isbn-13: 9780727725196. 303p.
2. Hughes. Phil & Ferrett. Ed (2012); "Introduction to Health and Safety In Construction: The Handbook For The Nebosh National Certificate In Construction", Routledge. ISBN 13: 9781136080616. 724p.
3. Stranks, Jeremy (2010) "Health and Safety at Work: An Essential Guide For Managers", Kogan Page Publishers. ISBN 13: 9780749461201. 352p.
4. Construction Safety Manual Published By National Safety Commission of India.
5. "Safety Management in Construction Industry" – A Manual For Project Managers. Nicmar Mumbai.
6. "IS For Safety In Construction – Bureau Of Indian Standrads.
7. Girimaldi and Simonds (1989); "Safety management", AITBS, New Delhi. ISBN: 9780939874989.651p

Sr. No.	Examination	Module
1	T-1	Module 1 and 2
2	T-2	Module 3 and 4
3	Final Examination	Module 1 to 7

SEMESTER-I	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM107	**COURSE: Elective – I : Repair, Rehabilitation and Retrofitting Techniques**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

* 60% weightage for end semester exam

Course content:

Sr.No.	Description	Hr.
1	Importance of rehabilitation as a part of construction engineering.	**06**
2	Rehabilitation studies of buildings, underground construction, bridges, streets and highways, sewage treatment plants – masonry work, R.C.C. works, steel structures- types of distress.	**06**
3	Numerical condition surveys for foundation, structural and functional deterioration, design criteria, materials and techniques.	**06**
4	Predictive performance models, evaluating alternatives based on technical, commercial, management, financial feasibilities, data collection and database management, maintenance of rehabilitated structures.	**06**
5	Procedure adopted by BIFR (Board of Industrial and Financial Reconstruction).	**06**
6	Earthquake damages of buildings,their retrofitting, restoration, effects of earthquakes, response of buildings to earthquake motion, factors related to building damages due to earthquake.	**06**
7	Methods of seismic retrofitting, restoration of buildings.	**06**

Recommended Books:

1. R. Dodge Woodson (2009);" Concrete Structures: Protection, Repair and Rehabilitation", ISBN: 9780080949819. 280p.

Sr. No.	Examination	Module
1	T-1	Module 1 and 2
2	T-2	Module 3 and 4
3	Final Examination	Module 1 to 7

SEMESTER-I	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM109	**COURSE: Elective – I : Disaster Management**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

* 60% weightage for end semester exam

Course content:

Sr.No.	**Description**	**Hr.**
1	Disasters – Natures and extent of disasters, natural calamities such as earthquake, floods, drought volcanoes, forest forest, coasts hazards, landslides etc.	**06**
2	Manmade disasters such as chemical and industrial hazards, nuclear hazards, fire hazards etc.	**06**
3	Disaster Management – Financing relief expenditure, legal aspects, rescue operations.	**06**
4	Casuallity management, risk management.	**06**
5	Emergency Management programme – Administrative setup and organization.	**06**
6	Hazard analysis, training of personnel, information management, emergency facilities and equipment necessary	**06**
7	Public awareness creation, preparation and execution of the emergency management programme.	**06**

Recommended Books:

1. Seetharaman (2000);" Construction Engineering and Management", ISBN: 13 9788188114061.487p.
2. K Nagarajan (2004);" Project Management", New Age International Ltd. ISBN: 13 9788122415575. 518p.
3. CECR's Journals
4. NICMAR Publications
5. Different Sites On Internet On Disaster Management

Sr. No.	Examination	Module
1	T-1	Module 1 and 2
2	T-2	Module 3 and 4
3	Final Examination	Module 1 to 7

SEMESTER-I	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM106	**COURSE: Elective – I : Construction Materials**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

* 60% weightage for end semester exam

Course content:

Sr.No.	Description	Hrs
1	Various construction chemicals/admixtures.	**06**
2	Flyash and its use in concrete , Silica fume concrete	**06**
3	Fibre Reinforced plastics and concrete, Smart materials	**06**
4	Self compacting concrete, High performance concrete	**06**
5	Materials used in nuclear-containment structures	**06**
6	Glenium Concrete	**06**
7	Crumb modified bitumen Rubber	**06**

Recommended Books:

1. Neville (2008);" Concrete Technology", Pearson Education India. ISBN: 9788131705360.452p.
2. M.S.Shetty (2005);" Concrete Technology", ISBN: 9788121900034.624p.
3. Ghosh (1991);" Building Materials", ISBN: 9788185522005.494p.
4. New Building Materials and Construction World magazine
5. Civil Engineering and Construction Review magazine

Sr. No.	Examination	Module
1	T-1	Module 1 and 2
2	T-2	Module 3 and 4
3	Final Examination	Module 1 to 7

SEMESTER-I	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM108	**COURSE: Elective – I : Management of Infrastructure Services**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

* 60% weightage for end semester exam

Course content:

Sr.No.	Description	Hr.
1	**Infrastructure management** Need and concept, expected performance, survey and Scheme of evaluation of distresses, inspection checklists, organization for rehabilitation, policies, funding	**06**
2	**Concept of infrastructure upkeep**	**06**
3	**Buildings** Post occupancy Scheme of evaluation of buildings, deformation and common defects in buildings, restoration & rehabilitation measures	**06**
4	**Pipelines (water/ sewage/ air/ gas)** Purpose and methods of Scheme of evaluation, Scheme of evaluation of physical condition, methods of rehabilitation	**06**
5	**Pavements (roadways / runways)** Scheme of evaluation and performance surveys, distress Scheme of evaluation, methods of resurfacing, overlays, restoring and rehabilitation, up-gradation and maintenance of permanent way	**06**
6	**Bridges,** Inspection and reporting methods, rehabilitation measures,	**06**
7	**Ports & Harbors** Inspection and reporting methods, Maintenance of ports, port buildings, and services.	**06**

Recommended Books:

Published books in the relevant areas to be supplemented by latest journal articles and papers, seminar and conference proceedings, in-house publications, monographs etc.

Sr. No.	Examination	Module
1	T-1	Module 1 and 2
2	T-2	Module 3 and 4
3	Final Examination	Module 1 to 7

SEMESTER-I	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM110	**COURSE: Elective – I : Construction Marketing**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

* 60% weightage for end semester exam

Course content:

Sr.No.	Description	Hr
1	**Marketing environment:** impact of internal and external environment, socio-economic, demographic, political, technological and legal environment, nature and impact of competition, marketing strategy	**6**
2	**Basics of marketing:** Features of marketing of consumer goods, industrial products and services, product and marketing, marketing organization structures, societal role of marketing	**6**
3	**Marketing projects I:** Characteristics of construction projects, sources of information, pre-qualification documents, bid preparation – estimating, provision for overheads and profit, bidding models, bidding strategy, pre-bid meetings, negotiation,	**6**
4	**Marketing projects II:** Legal aspects, impact of joint ventures, collaborations and alliances, impact of globalization and privatization, strategies for project export.	**6**
5	**Marketing real estate:** Characteristics of real estate, demand and supply relationship, segmentation, product mix, pricing strategies, advertising strategies, legal aspects	**6**
6	**Marketing products for construction:**	**6**

	Characteristics of construction materials and equipment, strategies for marketing of materials and equipment for construction, demand surveys, advertising strategies, communication, exhibitions and product demonstrations,	
7	Pricing strategies, financing arrangements for marketing products for construction	**6**

Recommended Books:

Published books in the relevant areas to be supplemented by latest journal articles and papers, seminar and conference proceedings, in-house publications, monographs etc.

Sr. No.	Examination	Module
1	T-1	Module 1 and 2
2	T-2	Module 3 and 4
3	Final Examination	Module 1 to 7

SEMINAR - I
MTCM121

M.Tech. in Civil Engineering with Construction Management

ACADEMIC SCHEME AND SYLLABUS
Year 2015-16

SEM II

SEMESTER-II	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM151	**COURSE:Legal Aspects in Construction**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

* 60% weightage for end semester exam

Course Objective:

- To describe fundamentals of common law
- To discuss the concept of bid cycle
- To explain Indian contract act
- To identify the concept contract administration
- To summarize students with Laws applicable to construction activity
- To interpret various acts in connection with construction activities
- To summarize FIDIC contracts

Course Outcome:students will be able to

- Use of law in general
- Practice tendering process
- Utilize Indian contract act and its provision with respect to construction
- Implement contract administration
- Use labor laws on construction site
- Relate acts applicable to construction
- Use International contract provisions

Course content

Module	**Topics**	**No.of Lectures**
1	Law and common man	04
2	Construction through contracts ;Types, critical comparison, bid cycle, tender and contract documents, contract conditions, study of contract documents of State PWD and CPWD	06
3	Indian Contract Act; Need, provisions, scope for modifications / improvement	06
4	Contract administration Deviations and extras, claims and their management, disputes and dispute resolution methods, Arbitration and Conciliation Act.	06

5	Laws applicable to construction activity need and broad provisions of : Industrial Disputes Act, Workmen's Compensation Act ,	06
6	Employer's Liability Act, Payment of wages Act, Contract Labour Act, Minimum Wages Act, Inter-state Migrant workmen act, BOCW Act and other acts introduced from time to time	06
7	FIDIC contracts; Contract administration;	06

Term work:-

Assignments consisting of minimum twenty problems covering entire syllabus shall be submitted as term work.

Recommended Books:-

1. Bajirao Shankarrao Patil (1986); "Legal Aspects of Building & Engineering Contracts" S.B. Patil. 471p.
2. G. T. Gajria, Kishore Gajria (2000); "Law Relating To Building & Engineering Contracts In India", Lexisnexis Butterworths India. ISBN 13: 9788187162162. 538p.
3. P. C. Markanda, Naresh Markanda (2013); "Law Related To Arbitration and Conciliation" Lexisnexis Butterworths India. ISBN 13: 9788180388132. 1570p.
4. Edward R. Fisk, Wayne D. Reynolds (2013); "Construction Project Administration" Pearson Education. ISBN 13: 9780133149258. 432p.
5. Indian Contract Act 1872
6. Arbitration Conciliation Act 1996.4. All Referred Bare Acts
7. CPWD Manual Volume I & II, A Handbook For Government Officials And Contractors

Sr. No.	Examination	Module
1	T-1	Module 1 and 2
2	T-2	Module 3 and 4
3	Final Examination	Module 1 to 7

SEMESTER-II	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM152	**COURSE: Management of Construction Resources**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

* 60% weightage for end semester exam

Course Objective:

- To Describe the concept of human Resources Management
- To explain concept of equipment Management
- To summarize concept of material management

Course Outcome:students will be able to

- Carry out human Resources Management
- Execute equipment Management
- Use materials management

Course content:

Sr.No.	Description	Hrs
1	**Human Resources Management** Staffing, recruiting, orientation and training, performance evaluating, merit rating Labour Management: Strikes and lockouts, collective bargaining, grievances and grievance settling procedure, labour welfare	**12**
2	**Equipment Management** Mechanization on construction projects, selection of major and minor equipment, production estimating, sizing and matching of equipment Sources of construction equipment: purchase, rent and lease, old and new equipment Economics of equipment, useful / economic life of equipment, equipment operation and service, maintenance, depreciation, obsolescence and replacement Equipment management systems, organizations, record keeping, training to operators	**12**
3	**MaterialsManagement** Importance,	**12**

	Estimation of materials, Classification and codification, ABC analysis Purchase function: legal aspects of purchase, inventory control, concept of EOQ Stores management, , minimizing wastage Material management systems, Organizations, record keeping	

Recommended Books:

1. Varma Mahesh (1975); "Construction Equipment, Its Planning & Application", Metropolitan & Co. 539p.
2. Gopalkrishnan (1977); "Materials Management: An Integrated Approach" PHI Learning Pvt. Ltd. ISBN 13: 9788120300279. 280p.
3. Nunnally (2000); "Managing Construction Equipment", Prentice Hall. ISBN 13: 9780139012167. 399p.

SEMESTER-II	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM153	**COURSE: Project Monitoring and Control**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	50
	Total		**150**
	Credits		**04**

* 60% weightage for end semester exam

Course Objective:

- To describe concept of project monitoring and control.
- To explain concept of cost and quality management
- Tosummarize concept of project safety and management information system

Course Outcome:students will be able to

- Carry out project monitoring and control
- Practice cost and quality management
- Execute project safety and management information system

Course content:

Sr.No.	**Description**	**Hrs**
1	**Project monitoring** Progress reporting,, review meetings, updating plans	**06**
2	**Schedule control** Common causes of schedule delays, measuring productivity, methods of enhancing productivity	**06**
3	**Cost control** Cost codification, earned value concept, variance analysis, alarm reports, control measures, client and contractor point of view	**06**
4	**Quality management** Concept of quality, aspects of quality, quality control and assurance, inspection, preparation of manuals and checklists	**06**
5	**Safety management** Types of accidents on construction work sites and their common causes, direct and indirect costs of accidents, occupational health hazards, general precautions to be followed for avoiding accidents, safety campaign, training for safety	**06**
6	**Integrated approach to project control**	**06**

	Project management information systems, computer networking	

Recommended Books:

1. Harold Kerzner, Ph.D., Kerzner (2009); "Project Management" John Wiley & Sons, ISBN 13: 9780470548486.
2. Pilcher R (1994); "Project Cost Control in Construction", John Wiley & Sons. ISBN 13: 9780632036370. 400p.
3. Jack R. Meredith, Samuel J. Mantel, Jr (2011); "Project Management: A Managerial Approach" John Wiley & Sons. ISBN 13: 9780470533024. 600p.
4. Ralph W. King, Roland Hudson (2008); "Construction Hazard & Safety Handbook" Butterworths. ISBN 13: 9780408013475. 477p.
5. Brian Thorpe, Peter Sumner, John M. Duncan (1996); "Quality Assurance in Construction" Gower Press. ISBN 13: 9780566077586. 153p

SEMESTER-II	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM154	**COURSE: Project Appraisal, Planning and Scheduling**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

*60% weightage for end semester exam

Course Objectives:

- To discuss project preparation, Analysis and Appraisal.
- To explain knowledge of Risk analysis its types, measures, tools for assessment.
- To identify Value analysis including job plan, function analysis, creative thinking, cost
- To summarize Modeling, life cycle costing, value engineering and management.
- To report Project planning and scheduling with reference to scheduling tools like bar Chart
- To outline the Network techniquessuch as CPM and PERT.

Course Outcomes:

Students will be able to:

- Carry out planning, execution and controlling of projects in Civil Engineering.
- Demonstrate their capability for preparing project networks and time cost relationship at their own which is useful for their future.
- Able to use life cycle costing, value engineering and management.
- Utalize Project planning and scheduling with reference to scheduling tools like bar Chart
- Practice the Network techniquessuch as CPM and PERT.

Course content:

Sr.No.	**Description**	**Hrs**
1	**Project Preparation, Analysis and Appraisal** Project development cycle, project ideas, preliminary screening Analysis and appraisal: market and demand, technical, financial, economic, ecological Estimating methods: parameter, cost capacity factor, cost indices, detailed estimates, provisionfor escalation, inflation and contingencies	**06**

	Financial appraisal criteria : NPV, BCR, IRR, Urgency, payback period, ARR, critical Scheme of evaluation of various criteria, investment appraisal in practice	
2	**Project Planning:** Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning, role of client and contractor, level of detail. Process of development of plans and schedules, work break-down structure, activity lists, assessment of work content, estimating durations, sequence of activities, activity utility data.	**06**
3	**Project Scheduling** Bar charts, Networks: basic terminology, single and overlapping relationships preparation of CPM networks: activity on link and activity on node representation, analysis of single relationship (finish to start) networks, computation of float values, critical and semi-critical paths, calendaring the events. PERT: Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations, calculation of probability of completion	**06**
4	**Resource Scheduling:** Bar chart, line of balance technique, resource constraints and conflicts, resource aggregation, allocation, smoothening and leveling	**06**
5	**Risk analysis**: Types, measures, tools for assessment and analysis	**06**
6	**Value analysis:** Job plan, function analysis, creative thinking, cost modeling, life cycle costing, value engineering and management	**06**
7	**Project Costing and Budgeting** Classification of costs, time cost trade-off in construction projects, Compression and decompression. Preparing budgets, master networks. At least one assignment shall be done using any project planning and scheduling software as part of term work.	**06**

Recommended Books:

1. Prasanna Chandra (1986); "Projects preparation, appraisal, budgeting & implementation", Tata McGraw Hill. ISBN-13: 978-0074516287. 543p.
2. Gregory T. Haugan (2002); "Project Planning and scheduling" Management Concepts Inc. ISBN 13: 9781567261363. 102p.
3. Saleh A. Mubarak (2012); "Construction project scheduling and control" John Wiley & Sons. ISBN 13: 9780470919958. 480p.
4. James Lewis (2005); "Project Planning, Scheduling & Control, 4E: A Hands-On Guide to Bringing Projects in on Time and on Budget" McGraw-Hill Companies, Incorporated. . ISBN 13: 9780071460378. 510p.
5. Eric S. Norman, Shelly A. Brotherton, Robert T. Fried (2010); "Work Breakdown Structures: The Foundation for Project Management Excellence" John Wiley & Sons. ISBN 13: 9781118000267. 304p.
6. Project Management Institute (2006); "Practice Standard for Work Breakdown Structures"' Project Management Institute, ISBN 13: 9781933890135. 111p.
7. Robert B. Harris (1978); "Precedence & arrow networking techniques for construction" Wiley. ISBN 13: 9780471041238. 448p.

8. Antill&Woodhead (1990); "Critical path methods in construction practice", John Wiley & sons. ISBN-13: 978-0471620570. 440p.
9. Chitkara K K (1998); "Construction Project Management", Tata McGraw Hill, ISBN 13: 9780074620625, 558p.
10. Barrie D.S. & Paulson B C (1992); "Professional Construction Management" , McGraw Hill., ISBN :13 9780070038899. 577p.
11. Harold R. Kerzner (2013); "Project management: A system approach to planning, scheduling and controlling" John Wiley & Sons. ISBN 13:9781118415856. 1296 p.

Sr. No.	Examination	Module
1	T-1	Module 1 and 2
2	T-2	Module 3 and 4
3	Final Examination	Module 1 to 7

SEMESTER-II	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM155	**COURSE: Elective – II: Risk Management**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	50
	Total		**150**
	Credits		**04**

* 60% weightage for end semester exam

Course content:

Sr.No.	**Description**	**Hrs**
1	Risk analysis and Management for projects (RAMP) – Identifying risk events. Probability distribution. Stages in Investment life-cycle; Determination of NPV and its standard deviation for perfectly co-related, moderately co-related and un-correlated cash flows.	06
2	Sensitivity analysis	06
3	scenario analysis simulation, decision tree analysis, risk profile method, certainly equivalent method; risk adjusted discount rate method, certainty index method, 3 point estimated method; use of risk prompts, use of Risk Assessment tables, details of RAMP process, utility of Grading of construction entities for reliable risk assessment.	06
4	Risk Mitigation – by elimination, reducing, transferring, avoiding, absorbing or pooling. Residual risk, mitigation of unquatified risk. Coverage of risk through CIDC's MOU with the Actuarial Society of India through risk premium such as (BIP) – Bidding Indemnity Policy (DIMO) – Delay in meeting obligation by client policy, (SOC) – Settlement of claims policy (LOP)- Loss of profit policy (TI).	06
5	Transit Insurance policy (LOPCE) Loss of performance of construction equipment policy.	06

Recommended Books:

1. Faculty of Actuaries (Great Britain), Institute of Actuaries (Great Britain) (2005); "RAMP - Risk Analysis and Management for Projects: A Strategic Framework for Managing Project Risk and Its Financial Implications". Thomas Telford. ISBN 13: 9780727733900. 147p.
2. Seetharaman (2000);" Construction Engineering and Management", ISBN: 9788188114061.487p.
3. Prasanna Chandra (1986); "Projects preparation, appraisal, budgeting & implementation", Tata McGraw Hill. ISBN-13: 978-0074516287. 543p.
4. Dr.Surendra Kumar "Industrial Engineering and Management of manufacturing systems" .Satya Prakashan

SEMESTER-II	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM157	**COURSE: Elective – II : Value Engineering**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

* 60% weightage for end semester exam

Course content:

Course Objectives:

1. To describe concept and importance of Value Enegineering
2. To discuuss Value analysis and management.
3. To summarize life cycle costing for the construction project.

Course Outcomes: students will be able to

1. Illustrate the concept and importance of Value Engineering
2. Demonstrate their capability for Value analysis and management..
3. Use of Life cycle costing for the construction project.

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Sr.No.	**Description**	**Hrs**
1	Value : Meaning of value, basic and secondary functions, factor contributing to value such as aesthetic, ergonomic, technical, economic : identifying reasons or unnecessary costs :	12
2	Value Analysis: 10 Commandments of value analysis; value analysis team; principles of value analysis, elements of a job plan viz. orientation, Information, presentation. Implementation, follow up action, benefits of value analysis, various applications; assessing effectiveness of value analysis.	12
3	Life cycle costing – Forecasting of Capital as well as operating & maintenance costs, time value, present worth analysis, DCF methods, ROR analysis, sensitivity analysis.	12

Recommended Books:

1. Zimmerman & Hart (1982);" Value engineering - a practical approach for owners, designers &contractors", CBS Publishers. ISBN: 9780442295875.279p.

SEMESTER-II	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM159	**COURSE: Elective – II : International Construction Business**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

*60% weightage for end semester exam

Course content:

Sr.No.	Description	Hrs
1	**International economy** International political system, economic system, multinationals, features of international trade & investment, national interest in international trade	
2	**International payments** International monetary system, balance of international payments, transfer of international payments, foreign exchange rates and their determination	
3	**Theories of international trade** Developing countries in the world economy, international differences in technology, policy implications for host countries	
4	**Cultural environment of international business** Effect of culture, language, education, religion, value systems on business, impact on management styles in selected countries	

Recommended Books:

Published books in the relevant areas to be supplemented by latest journal articles and papers, seminar and conference proceedings, in-house publications, monographs etc.

SEMESTER-II	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM156	**COURSE: Elective – II : International Contracting**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

*60% weightage for end semester exam

Course content:

Sr.No.	Description	Hrs
1	International contracting – meaning, scope, nature, present status of the International construction market, role of Asia- Pacific region countries in the present construction development. Impact of WTO/GATS on the Indian Construction Sector as regards domestic market and export sector.	
2	Study and application of various conditions of contract under the FIDIC document development of regulatory framework. Project exports from India.	
3	International financing: Various institutions such as WB, IMF, ADB. African bank etc. and their role, rules – regulations in funding various projects, forming alliance, bilateral and multilateral funding, trade practices etc.	
4	International Projects – Types of BOT systems such as BOT, BOOT, BOO, DBO, BOR, BLT, BRT, BTO & DBGO, MOOT, ROO, ROT, BOLT – Contractual procedures, special features, methods of handling.	

5	Selection of personnel to suit socio-economic-environmental culture in other countries, suitable organisational structure.	
6	Disputes Resolving – International Courts, formation of DRB's (Dispute resolving boards) functioning and experiences in India and abroad, Advantages of DRB's	
7	CASE studies of any 2 major project executed/functioning under International contracting.	

Recommended Books:

1. FIDIC documents
2. Simon M.S. McGraw Hill (2007);" Construction Contracts & Claims", New York. ISBN: 9780070574335. 278 p.
3. Unified Contract Documents by CIDC
4. Reboert Matays and Mathews (1995);" Dispute Review Board Manual", ISBN-13: 978-0070410602.
5. K.N.Vaid (1991);" International Construction Contracting", NICMAR Publication. ISBN: 9788185448169.

Sr. No.	Examination	Module
1	T-1	Module 1 and 2
2	T-2	Module 3 and 4
3	Final Examination	Module 1 to 7

SEMESTER-II	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM158	**COURSE: Elective – II : Management of Housing Projects**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

*60% weightage for end semester exam

Course content:

Sr.No.	**Description**	**Hrs**
1	**National housing policy** Need and importance of housing, role of various state and national level agencies, local bodies etc., rural and urban housing, systems approach to housing and urban planning	
2	**Managing technology** New developments: materials, construction techniques, low cost housing, mass housing, industrialized housing, appropriate technology	
3	**Planning** Pre-execution phase, project phase and post-execution phase	
4	**Management of building services** Water supply, waste disposal, lifts, HVAC systems	
5	**Maintenance of buildings** Need and importance, organization and management	
6	**Estate management** Policy and organization	

Recommended Books:

Published books in the relevant areas to be supplemented by latest journal articles and papers, seminar and conference proceedings, in-house publications, monographs etc.

SEMESTER-II	**CLASS: M.Tech. (Civil) with Construction Management**		
CODE: MTCM160	**COURSE: Elective – II : Total Quality Management in Construction**		
Period per week (Each of 60 minutes)	Lecture	03	
	Laboratory	--	
	Tutorial	02	
Scheme of evaluation		Duration (Hrs)	Marks
	In Semester Tests	01	20 X 02
	End Semester Exam*	04	100
	In semester Scheme of evaluation	--	25
	Total		**125**
	Credits		**04**

*60% weightage for end semester exam

Course content:

Sr.No.	**Description**	**Hrs**
1	Quality: Necessity for improving Quality in the context of Global Challenges.	06
2	Concept of Quality Control, Quality Assurance, Quality Management and Total Quality Management (TQM)	06
3	Study of various Quality Standards in Construction : Related to building materials and other inputs for construction processes, methods and techniques for construction outputs, products and services, such as BIS, BS, Indian standard, British, American, German & Japanese standards, Managing Quality in various projects stages from concept to completion by building quality into design of structures, Inspection of incoming material and machinery In process quality inspections and tests.	06
4	Designing of quality manuals, checklists and inspection reports, installing the quality assurance system, monitoring and control.	06
5	Quality Assurance Department and quality control responsibilities of the line organization. Quality in foundations and piling work, structural work. Concreting, electrical system building facilities, waste recycling and maintenance.	06
6	Developing quality culture in the organization : Training of people, Bench – marking quality. Quality circles.	06
7	Study of ISO 9000, ISO 14000 and QS 9000 standards and certification procedures.	06

Recommended Books:

1. Rumane, Abdul Razzak (2011);" Quality management in construction projects", ISBN: 9781439838723 464p.

Sr. No.	Examination	Module
1	T-1	Module 1 and 2
2	T-2	Module 3 and 4
3	Final Examination	Module 1 to 7

MINI PROJECT/ Seminar II MTCM171

SEM-III

MTCM176 Seminar on Literature Review

The project work extends through the third and fourth semester. The project work is defined based on the interest of the students to specialize in a particular area. Students are expected to carry out independent research work on the chosen topic and submit a thesis for Scheme of evaluation? The work at this stage may involve review of literature, laboratory experimental work, development of software, development of model, case study, field data collection and analysis etc. On completion of the work the student shall prepare a report and will give a Seminar on the report.

MTCM177 Dissertation Seminars Stage I

Student shall finalize a theme, related to construction engineering and/or management area for the dissertation work. Student shall prepare a report on the theme outlining importance of the theme of the study, objective, scope of work, methodology, and a review of literature published in the relevant area. The student shall present seminars on this report.

SEM – IV

MTCM178 Dissertation Seminars Stage II

Student shall study the problem of dissertation in the light of outcome of Stage I and Stage II seminars. On completion of data collection, analysis, and inferencing the student shall prepare an interim report and shall present a seminar on the work done, before the submission of Synopsis.

MTCM179 Dissertation and Viva Voce

On finalization of the dissertation student shall submit the dissertation report. The student shall have to appear for a Viva-voce examination for the dissertation.